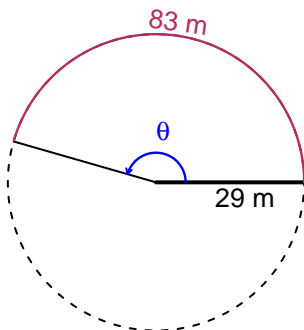# Trig Final (SLTN v604)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 29 meters. The arc length is 83 meters. What is the angle measure in radians?
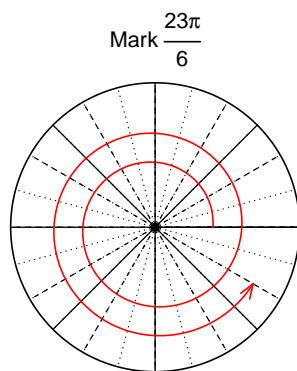

$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$
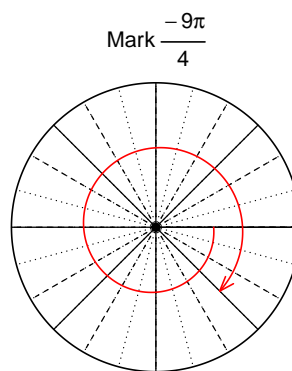
$\theta = 2.862$ radians.

Question 2

Consider angles $\frac{23\pi}{6}$ and $\frac{-9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{23\pi}{6}\right)$ and $\sin\left(\frac{-9\pi}{4}\right)$ by using a unit circle (provided separately).

Mark $\frac{23\pi}{6}$

Find cos(23π/6)

Mark $\frac{-9\pi}{4}$

Find sin(−9π/4)

$\cos(23\pi/6) = \frac{\sqrt{3}}{2}$
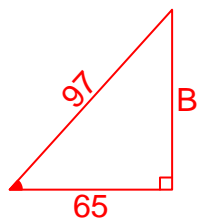
$\sin(-9\pi/4) = \frac{-\sqrt{2}}{2}$

Question 3

If $\cos(\theta) = \frac{65}{97}$, and θ is in quadrant IV, determine an exact value for $\sin(\theta)$.
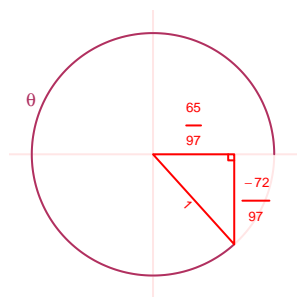
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.

Solve the Pythagorean Equation

$$65^2 + B^2 = 97^2$$
$$B = \sqrt{97^2 - 65^2}$$
$$B = 72$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.

$$\sin(\theta) = \frac{-72}{97}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 8.57 Hz, a midline at $y = -5.39$ meters, and an amplitude of 7.56 meters. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -7.56\cos(2\pi 8.57t) - 5.39$$

or

$$y = -7.56\cos(17.14\pi t) - 5.39$$

or

$$y = -7.56\cos(53.85t) - 5.39$$